EXHIBIT 4

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

GOOGLE LLC,
 	
              Plaintiff
 	
  v.
 	
SONOS, INC.,
 	
             Defendant.
	Case No. 3:20-cv-06754-WHA

GOOGLE LLC'S THIRD SUPPLEMENTAL OBJECTIONS AND RESPONSES TO PLAINTIFF SONOS, INC.'S FIRST SET OF FACT DISCOVERY INTERROGATORIES (NOS. 13, 14, 15)

Pursuant to Rule 33 of the Federal Rules of Civil Procedure, Defendant Google LLC ("Google") hereby objects and responds to Plaintiff Sonos, Inc.'s ("Sonos") First Set of Fact Discovery Interrogatories to Defendant ("Interrogatories"). Google responds to these Interrogatories based on its current understanding and the information reasonably available to Google at the present time. Google reserves the right to supplement these responses if and when additional information becomes available.

GENERAL OBJECTIONS AND RESPONSES

1.   These responses are made only for the purposes of discovery in this action. Each response is subject to all appropriate objections as to competence, relevance, materiality, and any and all other objections and grounds that would require the exclusion of any information, documents, or statements contained in the responses if such information, documents, or statements were offered in court. Google expressly reserves all such objections and may interpose them at the time of trial or at any other time.

2.   Google reserves all objections as to the admissibility at trial of any information or documents identified in its responses to these Interrogatories. By identifying any document or supplying any information, Google does not admit that such information or document is relevant to or admissible in this litigation. Google reserves the right to object to further inquiry with respect to any subject matter.

3.   Google objects to the interrogatories, and to the definitions, to the extent that they purport to impose any obligations upon Google beyond the Federal Rules of Civil Procedure and the Local Rules of the United States District Court for the Northern District of California.

4.   Google objects to the definition of "Defendant," "Google," "You," or "Your" on the grounds that the definitions are overly broad, unduly burdensome, and vague, including but not limited to the extent that they include: any Google parent, subsidiary, division, or related company; any business entity controlled by or operated on behalf thereof; any predecessors thereof; and any and all agents, directors, owners, officers, attorneys, employees, representatives, subcontracts, and/or any person acting on its behalf.

5.   Google objects to the definition of "Accused Cast-Enabled App(s)" on the grounds that the definition is overly broad, unduly burdensome, and vague, including but not limited to the extent that it includes: any Google Cast-enabled app other than the YouTube Music app, Google Play Music app, YouTube app, Google Podcasts app, and YouTube TV app, and any third-party Cast-enabled app that allows a user to "cast" to an Accused Cast-Enabled Media Player (including but not limited to the Spotify app), and any Cast-enabled software (e.g., firmware and/or Cast-enabled apps) executable on an Accused Cast-Enabled Display that enables a user to "[m]ove media

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1   from one cast device to another," either collectively or individually. Google will respond with

2   respect to the YouTube Music app, Google Play Music app, YouTube app, Google Podcasts app,

3   and YouTube TV app.

4   6.   Google objects to the definition of "Accused Google Product(s)" to the extent it

5   includes Sonos's definition of the term "Accused Cast-Enabled App(s)."

6   7.   Google objects to the definition of "Accused Google Server[s]" on the grounds that

7   the definition is overly broad, unduly burdensome, and vague, including but not limited to the extent

8   that it purports to include: any server that hosts at least one of the Accused Cast-Enabled App(s) for

9   download, any server that facilitates casting from Chromecast-enabled apps to Accused Cast-

10 Enabled Media Player(s), any server that facilitates moving media from one cast device to another,"

11 and any server that, in response to user input at any Accused Cast-Enabled App, facilitates delivering

12 media to an Accused Cast-Enabled Media Player (including but not limited to any Cloud Content

13 Delivery Network (CDN) server), either collectively or individually. Google will respond with

14 respect to the servers specifically accused in Sonos's infringement contentions.

15   8.   Google objects to the instructions regarding "identify," "describe," or "identity" in

16 the context of a person on the grounds that the instructions are overly broad, unduly burdensome,

17 and vague, including but not limited to the extent that they require inclusion of: the person's present

18 or last known home address, business and e-mail addresses, and respective phone numbers; present

19 or last known place of employment and position; and his or her connection to the subject matter of

20 the interrogatory.

21   9.   Google objects to the instructions to "identify," "describe," or specify the "identity"

22 in the context of a person who is a past or present director, officer, employee, agent, or representative

23 of Google on the grounds that the instructions are overly broad, unduly burdensome, and vague,

24 including but not limited to the extent that they require specification of: all positions or employments

25 held by that person with Google, and the dates between which each such position or employment

26 was held.

27   10.   Google objects to the instructions to "identify," "describe," or specify the "identity"

28 in the context of an entity on the grounds that the instructions are overly broad, unduly burdensome,

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and vague, including but not limited to the extent that they require specification of: the entity's place of incorporation or other business organization; it's principal places of business; its present or last known mailing and physical address(es) and e-mail and website addresses; its present or last known phone number; the type of entity or organization, its date and place of formation and any place(s) in which it is registered to conduct business; its registered agent; and the identity of all individuals employed by or acting for it at any time who have knowledge of the matter with respect to which the entity is identified.

11.   Google objects to the instructions to "identify," "describe," or specify the "identity" in the context of a document on the grounds that the instructions are overly broad, unduly burdensome, and vague, including but not limited to the extent that they require specification of: the date it was authored, sent, and/or received; the identity of the author of the document; the identity of any recipient of the document; and the identity of the custodian of the document.

12.   Google objects to the instructions to "identify," "describe," or specify the "identity" in the context of a communication on the grounds that the instructions are overly broad, unduly burdensome, and vague, including but not limited to the extent that they require specification of: the date it was authored, sent, and/or received; the identity of the author of the document; the identity of any recipient of the document; and the identity of the custodian of the document. Google further objects to the instructions regarding "identify," "describe," or "identity" in the context of a communication to the extent that they suggest Google is required to search and produce electronically stored information (ESI) before Sonos has shown good cause for ESI discovery, and the parties have agreed on a procedure for doing so in accordance with the Court's Standing Order.

13.   Google objects to the instructions to "identify," "describe," or specify the "identity" in the context of a thing on the grounds that the instructions are overly broad, unduly burdensome, and vague, including but not limited to the extent that they require specification of: its physical particulars; the day on which it was made; the identity of the persons who made it; the identity of the persons who asked that it be made; its present condition; and its present location.

14.   Google objects to the instructions to "state all facts" on the grounds that the instructions are is overly broad, unduly burdensome, and vague, including but not limited to the

extent that it requires specification of: the identification of any person or entity having knowledge of any such fact, including the last known address and phone number and the identity of any document, communication, or thing that refers, relates, or evidences any such fact.

15.   Google objects to each interrogatory to the extent it seeks information protected by the attorney-client privilege or the work product doctrine or that is otherwise privileged or protected from discovery.

16.   Google objects to each interrogatory to the extent that it seeks information that is not relevant to any claim or defense of any party or to the subject matter of this action, and is thus not proportional to the needs of the case.

17.   Google objects to each interrogatory to the extent it is compound and contains multiple subparts.

18.   Google objects to each interrogatory to the extent it is overbroad, unduly burdensome, vague, and/or ambiguous.

19.   Google objects to each interrogatory to the extent it seeks information that does not already exist or that is not in Google's possession, custody, or control.

20.   Google objects to each interrogatory to the extent it requires Google to provide information beyond what is available to Google at present from a reasonable search of its own files likely to contain relevant or responsive documents and from a reasonable inquiry of its present employees.

21.   Google objects to each interrogatory to the extent it seeks confidential or proprietary information, including without limitation, confidential business information, proprietary and/or competitively sensitive information, or trade secrets. Subject to its other General Objections, and to any specific objections set forth below, Google will only provide relevant information in a manner consistent with a Protective Order entered by the Court in this matter.

22.   Google objects to each interrogatory to the extent it is unlimited in time or otherwise not limited to a timeframe relevant to this litigation, and is therefore burdensome, oppressive, overly broad, and not proportional to the needs of the case.

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23. Google objects to each interrogatory to the extent it seeks a legal conclusion or expert testimony.

24. Google objects to each interrogatory to the extent it seeks information that is publicly available and therefore as accessible to Sonos as to Google.

25. Google objects to each interrogatory to the extent that it is premature. Discovery is ongoing, and Google has not yet completed its investigation of the matters at issue in this action. Google reserves the right to modify, supplement, change or amend its responses after the Court has issued its claim construction order, and once Google has conducted the necessary discovery and investigation.

26. Google's responses are not to be construed as an admission that any of the requested information exists, that any information is admissible, relevant or proportional to the needs of the case, or that any contention or assumption contained in the interrogatories, whether implicit or explicit, is correct.

1   **OBJECTIONS AND RESPONSES TO FACT DISCOVERY INTERROGATORIES**

2   **INTERROGATORY NO. 13**

3   Describe in detail how the Google Home app running on a computing device (e.g.,

4   an Accused Pixel Device, an Accused Cast-Enabled Display, or a third-party mobile phone or

5   tablet), independently or working with other software on the computing device, enables a user to

6   manually,"[1] as opposed to "dynamically," create a "speaker group"[2] of two or more Accused Cast-

7   Enabled Media Players and then play media from such a manually created "speaker group"

8   including, but not limited to, (i) describing in detail any information that is exchanged between the

9   computing device and the Accused Cast-Enabled Media Players to facilitate the aforementioned

10   functionality and how such exchange takes place, (ii) describing in detail any information that is

11   stored at the Accused Cast-Enabled Media Players to facilitate the aforementioned functionality and

12   how such storage takes place, and (iii) identifying by filename and method/function name the

13   specific source code related to the functionality described in (i)-(ii).

14   **OBJECTIONS:**

15   Google incorporates by reference all of its General Objections as if fully set forth herein.

16   Google objects to this interrogatory on the grounds that it is vague, ambiguous, unclear as to

17   information sought, and lacking sufficient particularity to permit Google to reasonably prepare a

18   response with respect to the undefined terms "manually," "dynamically," "third-party mobile phone

19   or tablet," "independently or working with other software on the computing device," "exchanged

20   between the computing device and the Accused Cast-Enabled Media Players," "facilitate," "who

21   such exchange takes place," "any information that is stored," "how such storage takes place,"

22   "filename," and "method/function name." Google further objects to this interrogatory to the extent

23   that it assumes the existence of hypothetical facts that are incorrect or unknown to Google.

24   _____

25   [1]   *See, e.g.*, https://blog.google/products/google-nest/new-multi-room-audio-control-nest/.

26   [2]   *See, e.g.*,

27   https://support.google.com/googlenest/answer/7174267?co=GENIE.Platform%3DAndroid&hl=e

28   n.

1   Google also objects to this interrogatory as overbroad, burdensome, and not proportional to

2 the needs of the case, including to the extent it seeks information that is not relevant to any claim or

3 defense of any party or to the subject matter of this action, including to the extent that it seeks

4 information about "a third-party mobile phone or tablet" and non-accused instrumentalities or

5 technology. Google further objects to this interrogatory as overbroad and unduly burdensome to the

6 extent that it seeks information that is publicly available, not uniquely within the control of Google,

7 or is equally available to Sonos. Google additionally objects to this interrogatory to the extent it

8 seeks communications and information protected from disclosure by the attorney-client privilege

9 and/or attorney work product doctrine. Google further objects to this interrogatory to the extent it

10 seeks confidential and/or proprietary business information. Google also objects to this interrogatory

11 to the extent that it premature seeks expert discovery, opinion, and/or testimony. Google additionally

12 objects to this interrogatory to the extent it seeks information that is not reasonably accessible or

13 that is not within Google's possession, custody, or control.

14 **RESPONSE:**

15   Subject to and without waiving the foregoing General and Specific objections, Google

16 responds, as follows:

17   Google objects to this interrogatory as vague, ambiguous, unclear as to information sought,

18 and lacking sufficient particularity to permit Google to reasonably prepare a response. Google is

19 willing to meet and confer to clarify the scope of this request, in particular to the extent it seeks

20 information regarding how the Google Home app "enables a user to 'manually,' as opposed to

21 'dynamically,' create a 'speaker group.'"

22 **SUPPLEMENTAL RESPONSE:**

23   Google maintains the General and Specific objections set forth above. Google further

24 objects to this interrogatory on the grounds that it is vague and ambiguous to the extent it seeks

25 information regarding products not specifically identified by make or model number in Sonos's

26 infringement contentions. For example, Google objects to Accused Cast-Enabled App to the extent

27 it seeks information regarding products not specifically identified in Sonos's infringement

28 contentions. Google also objects to this interrogatory to the extent it seeks to encompass Spotify,

1   which is a separate, third-party application. Subject to and without waiving the foregoing General

2   and Specific objections, Google responds, as follows:

3   A message that is received by a group member during configuration of the speaker group is

4   a join_group command. The join_group command instructs the device to join a group, and it may

5   be received from a device using the Cast protocol. The join_group command is a JSON message

6   that may include keys and values such as channel selection (left, right, or empty),

7   multichannel_group (true or false), UUID (unique ID identifying the group), group name, stereo

8   balance, leader. The Google Home app is an example of an application that can send a join_group

9   command, although it may not set each variable of that command, such as leader. In the Google

10 Home app, a user may select a specific device and add it to a group in Home app, which causes the

11 Google Home app to send a join_group command to that device. In the scenario where a user is

12 configuring a new group of two players, both players may receive the join group command. The

13 relevant devices will continually elect a leader device. The first time that election process takes

14 place is as soon as the first device receives the join group command for that group. Each device

15 may announce its group membership and group characteristics over a broadcast mechanism such as

16 mDNS. *See* GOOG-SONOSWDTX-00051041; GOOG-SONOSWDTX-00048962. Although a

17 user's handheld device on the same network and properly configured may receive those messages,

18 it may not process or recognize them and is not configured to do so by Google's products. If a group

19 has been created, the devices in the group use a record of the group name and its unique identifier,

20 which may be referred to as being in a prefs file. *See* GOOG-SONOSWDTX-00051041; GOOG-

21 SONOSWDTX-00048962. That file will not include information regarding which follower or

22 followers is in the group. Individual devices do not store group membership information for other

23 devices persistently; rather, the leader has a set of connections from the follower devices in memory,

24 on a group-by-group basis. A launch request is one of the messages that a leader may receive at the

25 time that a Cast session is launched with a group. A group may be launched without sending a load

26 command where playback is not yet happening at the mobile phone. In some scenarios, if the mobile

27 phone is engaged in a local playback of audio at the time that the user chooses to launch a Cast

28 session with a group, a load command depending on the specific app implementation may be

1   sent. The leader of a group, in some circumstances prior to initiating playback, may receive a URL

2   to network content from a sender app. In other circumstances, a sender app may not be the source

3   of a Cast session. Generally, when a group launch request is received, the leader may send a launch

4   notification to all followers over the TCP control channel. When a launch request is received, the

5   requested app is launched on the leader device if possible, and when the content app has been

6   launched, multizone code receives a notification that the app has been launched and was targeted at

7   a specific group. At that point it may send out a launch notification. Certain code within

8   group_follower_control.CC may be executed on a follower in response to receiving a launch request

9   from a leader. In response to receiving the launch request, error conditions may be checked,

10   memory variables may be corrected for state, and the bounds on the clock offset request rate may

11   be modified. Timers are started that periodically log information, and a follower app may be

12   launched. One of the required steps for the player to begin actively operating as a follower is

13   launching the follower app. There may be a message received from the leader that when the follower

14   receives it, causes it to launch the follower app. Source code partially responsible for receiving the

15   group launch command at the leader is the application_namespace_handler.cc file, although the

16   launch request itself is handled across many modules. multizone_manager.cc may receive a

17   notification that the application has been launched.

18   Google Cast is an mDNS service that can provide announcements from devices indicating

19   that they support the Cast protocol. *See* GOOG-SONOSWDTX-00051041. The group leader (if

20   any) may announce itself as a googlecast service with the group name but pointing at a different

21   port than the normal googlecast port to differentiate launch requests for the group (as opposed to

22   launch request for the specific device). *See id.* The leader of the group may use Google Cast service

23   to announce the presence of the group as a Google Cast service, including the port, so that devices

24   may connect to it. *See id.*

25   The Cast stream expansion is a feature whereby if a user is playing an audio stream, they

26   can add additional devices to that audio stream, which is related to dynamic grouping. *See* GOOG-

27   SONOSNDCA-00056732. The behavior of adding a device to playback and removing a device

28   from playback is described therein and implemented in the source code produced by Google. Unlike

static groups, which may be created in the Google Home App before media starts playing; dynamic groups are formed when media is playing and an additional speaker is added to the playback group. Dynamic groups can also be further modified during playback.

INTERROGATORY NO. 14:

For each Accused Cast-Enabled App, describe in detail how the given Accused Cast-Enabled App (e.g., YouTube Music, YouTube, Google Play Music, Google Podcasts, Spotify) running on a computing device (e.g., an Accused Pixel Device, an Accused Cast-Enabled Display, or a third-party mobile phone or tablet), independently or working with other software on the computing device, enables a user to "cast,"[3] or otherwise move or transfer media,[4] to an Accused Cast-Enabled Media Player including, but not limited to, (i) describing in detail any information that is exchanged between the computing device, the Accused Cast-Enabled Media Player, and/or any Accused Google Server to facilitate the aforementioned functionality and how such exchange takes place, (ii) describing in detail any creation, existence, modification, or deletion of any "queue"[5] of one or more media items to facilitate the aforementioned functionality and how such creation, existence, modification, or deletion takes place, and (iii) identifying by filename and method/function name the specific source code related to the functionality described in (i)-(ii).

OBJECTIONS: Google incorporates by reference all of its General Objections as if fully set forth herein. Google objects to the characterization of this interrogatory as a single interrogatory given that it contains multiple discrete subparts under Fed. R. Civ. P. 33(a)(1). Google objects to this interrogatory on the grounds that it is vague, ambiguous, unclear as to information sought, and lacking sufficient particularity to permit Google to reasonably prepare a response with respect to the undefined terms "running on a computing device," "independently or working with other software on the computing device," "information that is exchanged," "facilitate," "how such exchange takes place," "creation, existence, modification, or deletion," "how such creation, existence, modification,

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[3] *See, e.g.*, https://support.google.com/googlenest/answer/7181830.
[4] *See, e.g.*, https://support.google.com/chromecast/answer/9563059?co=GENIE.Platform%3DAndroid&hl=en
.
[5] *See, e.g.*, https://developers.google.com/cast/docs/ios_sender/queueing.

1   or deletion takes place," "filename" and "method/function name." Google further objects to this

2   interrogatory to the extent that it assumes the existence of hypothetical facts that are incorrect or

3   unknown to Google.

4   Google also objects to this interrogatory as overbroad, burdensome, and not proportional to

5   the needs of the case, including to the extent it seeks information that is not relevant to any claim or

6   defense of any party or to the subject matter of this action, including to the extent that it seeks

7   information about "third-party servers" and non-accused instrumentalities or technology. Google

8   further objects to this interrogatory as overbroad and unduly burdensome to the extent that it seeks

9   information that is publicly available, not uniquely within the control of Google, or is equally

10 available to Sonos. Google additionally objects to this interrogatory to the extent it seeks

11 communications and information protected from disclosure by the attorney-client privilege and/or

12 attorney work product doctrine. Google further objects to this interrogatory to the extent it seeks

13 confidential and/or proprietary business information. Google also objects to this interrogatory to

14 the extent that it premature seeks expert discovery, opinion, and/or testimony. Google additionally

15 objects to this interrogatory to the extent it seeks information that is not reasonably accessible or

16 that is not within Google's possession, custody, or control.

17 **RESPONSE:**

18   Subject to and without waiving the foregoing General and Specific objections, Google

19 responds, as follows:

20   Pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Google further refers Sonos

21 to the source code that Google has made available and the following documents containing

22 information responsive to this interrogatory: GOOG-SONOSWDTX-00005033-53611.

23   **SUPPLEMENTAL RESPONSE:** Google maintains the General and Specific objections

24 set forth above. Google further objects to this interrogatory on the grounds that it is vague and

25 ambiguous to the extent it seeks information regarding products not specifically identified by make

26 or model number in Sonos's infringement contentions. For example, Google objects to Accused

27 Cast-Enabled App to the extent it seeks information regarding products not specifically identified

28 in Sonos's infringement contentions. Google also objects to this interrogatory to the extent it seeks

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1   to encompass Spotify, which is a separate, third-party application. Subject to and without waiving

2   the foregoing General and Specific objections, Google responds, as follows:

3   Google refers Sonos to the source code that Google has made available, which is the best

4   evidence of how the devices operate with respect to the operation of the accused functionalities.

5   Pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Google further refers Sonos to the

6   following documents created during product development which may contain information response

7   to this interrogatory: GOOG-SONOSWDTX-00041650,   GOOG-SONOSWDTX-00039521,

8   GOOG-SONOSWDTX-00041722,   GOOG-SONOSWDTX-00040397,   GOOG-SONOSWDTX-

9   00042266,   GOOG-SONOSWDTX-00042272,   GOOG-SONOSWDTX-00042282,   GOOG-

10   SONOSWDTX-00042365, GOOG-SONOSWDTX-00042378, GOOG-SONOSWDTX-00042380,

11   GOOG-SONOSWDTX-00042385,   GOOG-SONOSWDTX-00042397,   GOOG-SONOSWDTX-

12   00042402,   GOOG-SONOSWDTX-00042404,   GOOG-SONOSWDTX-00042413,   GOOG-

13   SONOSWDTX-00042754, GOOG-SONOSWDTX-00042954, GOOG-SONOSWDTX-00043052,

14   GOOG-SONOSWDTX-00043318,   GOOG-SONOSWDTX-00043323,   GOOG-SONOSWDTX-

15   00043799-803,   GOOG-SONOSWDTX-00043820,   GOOG-SONOSWDTX-00051820,   GOOG-

16   SONOSWDTX-00051848, GOOG-SONOSWDTX-00051918, GOOG-SONOSWDTX-00051924,

17   GOOG-SONOSWDTX-00051927,   GOOG-SONOSWDTX-00052944-71,   GOOG-

18   SONOSWDTX-00051608, GOOG-SONOSWDTX-00051943, GOOG-SONOSWDTX-00037978,

19   GOOG-SONOSWDTX-00051947,   GOOG-SONOSWDTX-00037634,   GOOG-SONOSWDTX-

20   00053379,   GOOG-SONOSWDTX-00036998,   GOOG-SONOSWDTX-00037178,   GOOG-

21   SONOSWDTX-00037042, GOOG-SONOSWDTX-00037081, GOOG-SONOSWDTX-00037220,

22   GOOG-SONOSWDTX-00040331-83,   GOOG-SONOSWDTX-00043467,   GOOG-

23   SONOSWDTX-00043471, GOOG-SONOSWDTX-00043550, GOOG-SONOSWDTX-00037146,

24   GOOG-SONOSWDTX-00043548,   GOOG-SONOSWDTX-00043676,   GOOG-

25   SONOSWDTX-00037178; *see also* GOOG-SONOSWDTX-00005033-8471,   GOOG-

26   SONOSWDTX-00022175-371, GOOG-SONOSWDTX-00036346-53611.

27   **SECOND SUPPLEMENTAL RESPONSE:** Google maintains the General and Specific

28   objections set forth above. Google further objects to this interrogatory on the grounds that it is

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1 vague and ambiguous to the extent it seeks information regarding products not specifically identified

2 by make or model number in Sonos's infringement contentions. For example, Google objects to

3 Accused Cast-Enabled App to the extent it seeks information regarding products not specifically

4 identified in Sonos's infringement contentions or which have now been dropped from the case (*e.g.*,

5 Podcast). Google also objects to this interrogatory to the extent it seeks to encompass Spotify, which

6 is a separate, third-party application. Google further objects to this Interrogatory as vague and

7 ambiguous, for example as to its use of the term "queue" which is subject to claim

8 construction.   Subject to and without waiving the foregoing General and Specific objections,

9 Google responds, as follows:

10   For discovery of devices, the mDNS (multicast Domain Name System) protocol is used to

11 search for available devices on a Wi-Fi network. GOOG-SONOSWDTX-00039484. Available

12 Cast-enabled devices will respond with records indicating their IP addresses. The following

13 diagram illustrates this process:
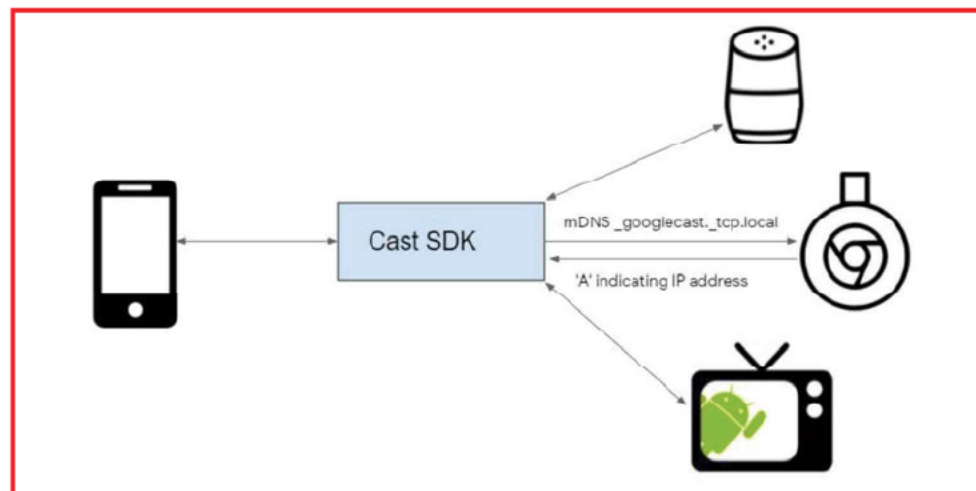
22   For applications that rely upon MDx (*e.g.*, YouTube and YouTube Music), to connect to

23 MDx with Cast, a user taps Cast route to start casting. The phone tells the Cast SDK to launch the

24 corresponding YouTube app. In turn, the Cast SDK launches the Cast receiver app, and once

25 launched, the Cast receiver app gets a screenID and lounge token. The Cast receiver app then

26 contacts the MDx session server with its lounge token to connect to the MDx session. In general,

27 the Cast receiver app sends its screen ID to the phone via the Cast SDK. The phone then contacts

28 the MDx Pairing server with a screenID to get the lounge token, and the phone next contacts the

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1   MDx session server with the lounge token to connect to the MDx session. *Id.* Casting does not

2   transfer a queue from the phone to the receiver app. Instead, when a user casts to the Cast receiver,

3   the phone sends a setPlaylist message to the MDX server, which then sends the Cast receiver a

4   setPlaylist message that requests the Cast receiver device to start playing the media identified by the

5   videoID, an index for the playlist, and playlistID stored in the cloud. *See also* Google's Response

6   to Interrogatory No. 15.

7   For GPM, the user selects a route, and the sender connects to the receiver. GOOG-

8   SONOSWDTX-00043467. In turn, the sender launches the GPM application on the receiver, sets

9   a queue in the cloud, creates a cast token, and sends that cast token to the receiver such that the

10 receiver can issue a GET "itemWindow" request and receive an mplay url for the first track to

11 play. *Id.*

12 **INTERROGATORY NO. 15:**

13   For each of the YouTube, YouTube Music, YouTube TV, Google Play Music, Google

14 Podcasts, and Spotify media services, describe in detail how an Accused Google Product (e.g., an

15 Accused Cast-Enabled Media Player or Accused Pixel Device) receives and then plays back a

16 sequence of media items (e.g., songs, podcast episodes, etc.) in connection with a given one of the

17 aforementioned media services including, but not limited to, (i) describing in detail any

18 communications between the Accused Google Product and any web server (e.g., Accused Google

19 Server or third-party server) and how such communications take place, (ii) describing in detail how

20 any Accused Google Server generates, maintains, and/or updates a set of one or more media-item

21 "recommendations"[6] that are sent to the Accused Google Product and how those

22 "recommendations" are sent to the Accused Google Product, and (iii) describing in detail how any

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27 [6] *See, e.g.*, https://www.youtube.com/howyoutubeworks/product-features/recommendations/;
    https://support.google.com/youtubemusic/answer/6313542?hl=en;
    https://support.google.com/websearch/answer/10017274?hl=en&co=GENIE.Platform%3DAndroi

28 d#zippy=.

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1 Accused Google Server facilitates Google's "Autoplay feature"[7] for playback at the Accused

2 Google Product and how the "Autoplay feature" is utilized at the Accused Google Product.

3 **OBJECTIONS:** Google incorporates by reference all of its General Objections as if fully set forth

4 herein. Google objects to the characterization of this interrogatory as a single interrogatory given

5 that it contains multiple discrete subparts under Fed. R. Civ. P. 33(a)(1). Google objects to this

6 interrogatory on the grounds that it is vague, ambiguous, unclear as to information sought, and

7 lacking sufficient particularity to permit Google to reasonably prepare a response with respect to the

8 undefined terms "receives and then plays back a sequence of media items," "in connection with a

9 given one of the aforementioned media services," "communications between the Accused Google

10 Product and any web server," "how such communications take place," "generates, maintains and/or

11 updates," "how those 'recommendations' are sent to the Accused Google Product," "how any

12 Accused Google Server facilitates Google's 'Autoplay feature' for playback at the Accused

13 Product," and "how the 'Autoplay feature' is utilized at the Accused Google Product." Google

14 further objects to this interrogatory to the extent that it assumes the existence of hypothetical facts

15 that are incorrect or unknown to Google.

16   Google also objects to this interrogatory as overbroad, burdensome, and not proportional to

17 the needs of the case, including to the extent it seeks information that is not relevant to any claim or

18 defense of any party or to the subject matter of this action, including to the extent that it seeks

19 information regarding non-accused instrumentalities or technology such as "Spotify media services"

20 and "third-party server[s]." Google further objects to this interrogatory as overbroad and unduly

21 burdensome to the extent that it seeks information that is publicly available, not uniquely within the

22 control of Google, or is equally available to Sonos. Google additionally objects to this interrogatory

23 to the extent it seeks communications and information protected from disclosure by the attorney-

24 client privilege and/or attorney work product doctrine. Google further objects to this interrogatory

25 to the extent it seeks confidential and/or proprietary business information. Google also objects to

26

27 [7] *See, e.g.,*
    https://support.google.com/youtube/answer/6327615?hl=en&co=GENIE.Platform%3DAndroid;

28 https://support.google.com/websearch/answer/10017274?hl=en&co=GENIE.Platform%3DAndroid#zippy=.

this interrogatory to the extent that it premature seeks expert discovery, opinion, and/or testimony. Google additionally objects to this interrogatory to the extent it seeks information that is not reasonably accessible or that is not within Google's possession, custody, or control. Google further objects to this interrogatory to the extent it seeks information that is unnecessarily cumulative or duplicative of information sought by other discovery, including Request for Production No. 20.

RESPONSE:

Subject to and without waiving the foregoing General and Specific objections, Google responds, as follows:

Pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Google further refers Sonos to the source code that Google has made available and the following documents containing information responsive to this interrogatory: GOOG-SONOSWDTX-00005033-53611.

SUPPLEMENTAL RESPONSE: Google maintains the General and Specific objections set forth above. Google further objects to this interrogatory on the grounds that it is vague and ambiguous to the extent it seeks information regarding products not specifically identified by make or model number in Sonos's infringement contentions. Google also objects to this interrogatory to the extent it seeks to encompass Spotify, which is a separate, third-party application. Subject to and without waiving the foregoing General and Specific objections, Google responds, as follows:

Google refers Sonos to the source code that Google has made available, which is the best evidence of how the devices operate with respect to the operation of the accused functionalities. Pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Google further refers Sonos to the following documents created during product development which may contain information response to this interrogatory: GOOG-SONOSWDTX-00041650, GOOG-SONOSWDTX-00039521, GOOG-SONOSWDTX-00041722, GOOG-SONOSWDTX-00040397, GOOG-SONOSWDTX-00042266, GOOG-SONOSWDTX-00042272, GOOG-SONOSWDTX-00042282, GOOG-SONOSWDTX-00042365, GOOG-SONOSWDTX-00042378, GOOG-SONOSWDTX-00042380, GOOG-SONOSWDTX-00042385, GOOG-SONOSWDTX-00042397, GOOG-SONOSWDTX-00042402, GOOG-SONOSWDTX-00042404, GOOG-SONOSWDTX-00042413, GOOG-

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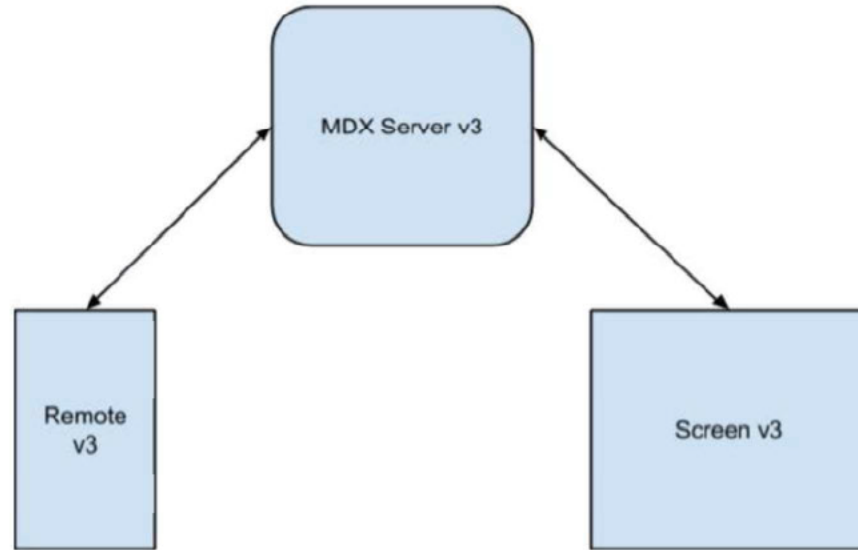
SONOSWDTX-00042754, GOOG-SONOSWDTX-00042954, GOOG-SONOSWDTX-00043052, GOOG-SONOSWDTX-00043318, GOOG-SONOSWDTX-00043323, GOOG-SONOSWDTX-00043799-803, GOOG-SONOSWDTX-00043820, GOOG-SONOSWDTX-00051820, GOOG-SONOSWDTX-00051848, GOOG-SONOSWDTX-00051918, GOOG-SONOSWDTX-00051924, GOOG-SONOSWDTX-00051927, GOOG-SONOSWDTX-00052944-71, GOOG-SONOSWDTX-00051608, GOOG-SONOSWDTX-00051943, GOOG-SONOSWDTX-00037978, GOOG-SONOSWDTX-00051947, GOOG-SONOSWDTX-00037634, GOOG-SONOSWDTX-00053379, GOOG-SONOSWDTX-00036998, GOOG-SONOSWDTX-00037178, GOOG-SONOSWDTX-00037042, GOOG-SONOSWDTX-00037081, GOOG-SONOSWDTX-00037220, GOOG-SONOSWDTX-00040331-83, GOOG-SONOSWDTX-00043467, GOOG-SONOSWDTX-00043471, GOOG-SONOSWDTX-00043550, GOOG-SONOSWDTX-00037146, GOOG-SONOSWDTX-00043548, GOOG-SONOSWDTX-00043676, GOOG-SONOSWDTX-00037178; *see also* GOOG-SONOSWDTX-00005033-8471, GOOG-SONOSWDTX-00022175-371, GOOG-SONOSWDTX-00036346-53611.

SECOND SUPPLEMENTAL RESPONSE:

Google maintains the General and Specific objections set forth above. Google further objects to this interrogatory on the grounds that it is vague, ambiguous, and overbroad to the extent it seeks information regarding products not specifically identified by make or model number in Sonos's infringement contentions, or that have now been dropped by Sonos (*e.g.*, Podcast). Google also objects to this interrogatory to the extent it seeks to encompass Spotify, which is a separate, third-party application. Subject to and without waiving the foregoing General and Specific objections, Google responds, as follows:

Google fully incorporates herein by reference its responses to Interrogatory No. 14. Google further responds that casting operations involving the identified "autoplay" feature are generally described at least in GOOG-SONOSWDTX-00043467, GOOG-SONOSWDTX-00041491 and implemented in the source code provided by Google.

The illustration below provides a simplified view of the general architecture that is employed by devices running MDx applications (*e.g.*, YouTube or YouTube Music):

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GOOG-SONOSWDTX-00041650. In this diagram, "Remote v3" represents a Remote client device, such as a phone that runs a YouTube client implementing version 3 of the MDx protocol. The Remote communicates with the MDx server, which in turn communicates with the Screen. The function in the file cast_mdx_session_service.ts connects the Screen to the MDx server. Once connected, the Screen can receive "methods" (*i.e.*, messages or commands) from the MDx server. An example of one such method is the "setPlaylist" method.

A setPlaylist message is sent from the Remote to the MDx server and relayed to the Screen and requests that the Screen start playing the media identified by the videoId. *Id.* at 8. The parameters of a setPlaylist message sent to the Screen are shown below:

Parameters:

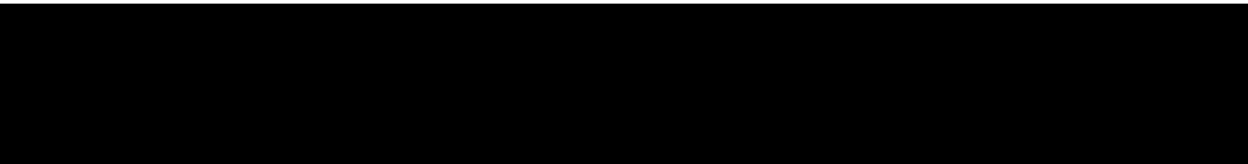| Name	Example	Description
videoId	n_yx_8rdRF8	Video that should start playback ASAP.
currentTime	12.3	Playback start time of **videoId**.
currentIndex	2	The 0-based index of the video in the given list.
listId	PLHnyfMqiRRGlu-2MsSQLbXA	List ID that this video is part of. If prefixed with **RQ**, the video is being played from the remote queue.
watchNextToken	Us-TVg48ExM_1aH3J8AADPQ	**Optional.** Opaque-to-the-client parameters used by the WatchNextService (usually a seed for the shuffle and/or mix playback).

Id.

In earlier versions of the MDx protocol (Version 2 and earlier) the setPlaylist message sent from the server to the Screen was a "list" of videoIds separated by a comma to represent the current playlist. In Version 3 of the MDx protocol (released in 2014) the setPlaylist message contains a single videoId (i.e., it is no longer a list) used to identify the video to play. *Id.*

Upon receiving a setPlaylist message, the function handleMessage() creates a PlaybackParams object to be passed to the accused setPlaylist() function. The PlaybackParams class comprises a number of fields:

- eventDetails: a MdxRemoteQueueEvent object
- videoId: string from the videoId field in the incoming "setPlaylist" method
- listId: string from the listId field in the incoming "setPlaylist" method; ID of the remote playlist

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- currentIndex: number derived from the currentIndex field in the incoming "setPlaylist" method
- currentTime: number
- playerParams: string from the playerParams field in the incoming "setPlaylist" method
- watchNextParams: string from the params field in the incoming "setPlaylist" method
- isFling: boolean
- isMdxPlayback: boolean
- isVoiceRequest: boolean
- enableSafetyMode: boolean
- forceReloadPlayback: boolean derived from the forceReloadPlayback field in the incoming "setPlaylist" method

As can be seen, the field "videoId" of the PlaybackParams class is a string from the videoId field in the incoming "setPlaylist" message. To playback a video, the function setPlaylist() uses the PlaybackParams object to play the video specified in the PlaybackParams.videoId field.

An example of a "method" the Screen can receive from the YouTube Frontend service is the "GetWatchNext" method. Generally, at some point after the Screen begins playback of the current media item, GetWatchNext is called by the Screen to request the next WatchEndpPoint. In response to GetWatchNext, the Screen receives WatchNextResponse, a protobuf message, which contains the videoId for the next item to play, along with metadata for the item currently playing, and other elements, such as an autoplay setting, for example.

Within the YT Main app, if the user has reached the end of a playlist, or there is no other item to play next, the autoplay feature could be used to continue playing content. Specifically, when WatchNextResponse is loaded, the local variable upNextVideoId would be used to notify the Remote of what the next autoplay media item is, but upNextVideoId would not be used by any function to perform playback. upNextVideoId is not used for YT Music, at least because YT Music does not enable autoplay.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that all counsel of record who have consented to electronic service are being served with a copy of this document via email on February 4, 2022.

/s/ Nima Hefazi
Nima Hefazi